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ABSTRACT OF A STUDY OF THE AMERICAN WOOD  
RATS, WITH DESCRIPTIONS OF FOURTEEN  
NEW SPECIES AND SUBSPECIES OF  
THE GENUS NEOTOMA.

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The following brief abstract of a study of the North American Wood Rats and Desert Rats, with descriptions of a dozen new forms from Mexico and the western United States, based on the rich collections of the United States Department of Agriculture, is here published in advance of a more formal paper on the group. The genus *Neotoma* is here restricted to the species in which the crown of the last lower molar is made up of two transverse loops; the species having the crown of this tooth shaped like the letter S are transferred to the genus *Ptyssophorus* of Ameghino, previously known from a single fossil species from South America. As thus restricted, the genus *Neotoma* is divided into two subgenera, *Neotoma* proper and *Teonoma*, which are complementary in their geographic distribution, *Neotoma* proper being Sonoran or Austral, while *Teonoma* is Boreal. It is convenient to subdivide the former into four minor groups, none of which is worthy of the distinction of subgeneric rank. These groups may be designated, from a typical species in each, as follows: (1) the *leucodon* group; (2) the *mexicana* group; (3) the *desertorum* group, and (4) the *arizonæ* group.

Subgenus NEOTOMA Ord, 1825.

Type, *Neotoma floridana* Ord, from Florida.

Tail commonly round, scant-haired and tapering, but in one species moderately bushy; hind feet small or moderate.

Rostrum of moderate length, never more than one-third the length of cranium; sagittal area usually rounded, the broadest part always considerably anterior to plane of interparietal, whence the sides curve gradually backward to interparietal shield; sphenopalatine vacuities always open.

(1) *Neotoma leucodon* group.—*Neotoma leucodon*, *latifrons*, *micropus*, *baileyi*, *floridana* and *pennsylvanica* form a fairly well circumscribed group, differing from the other subdivisions of the genus in having the frontals abruptly spreading and flattened immediately behind the interorbital constriction, the orbital margins upturned and pinched in, almost forming a bead; the nasal bones short and cuneate, tapering evenly to a dull point behind; the postpalatal notch moderately or broadly excavated (moderately in *leucodon*, very broadly in *floridana*); the upper molar series very much broader anteriorly than posteriorly ( $m^1$  nearly  $\frac{1}{2}$  broader than  $m^3$ );  $m^1$  comprising three transverse loops, the anterior of which is but slightly indented by the antero-internal sulcus—never divided by the deepening of this sulcus as in the *mexicana* series; color of teeth white or nearly white (except in *floridana*, which is an aberrant member of the group\*). *N. pennsylvanica* has certain primitive characters not shared by the others, and is more nearly intermediate between the subgenera *Neotoma* and *Teonoma* than any known living species. The group inhabits the Lower and Upper Sonoran Zones from Perote in Vera Cruz and Berriozabal in Zacatecas, northward to southern South Dakota.

(2) *Neotoma mexicana* group.—*Neotoma mexicana*†, *pinetorum*, *orizabæ tenuicauda*, *fulviventris*, *fallax* and *fuscipes* form a group of closely allied species agreeing in certain important cranial characters whereby they differ from all the other subdivisions of the genus. *N. fuscipes*‡ and *fallax* are somewhat aberrant members of the series. *Neotoma torquata* Ward probably belongs here also. The group seems to occupy a midway position in the genus, lacking the more specialized characters that distinguish the others.

\*In most species of *Neotoma* the osteodentine is dark and the reentrant angles are filled with a blackish substance.

†One subspecies of *mexicana* is here recognized: *N. mexicana bullata* from the Santa Catalina Mts. in Arizona.

‡The subspecies of *fuscipes* here recognized are *macrotis* Thomas from the southern coast region of California; *streatori* from the western slope of the Sierra Nevada and adjacent parts of the upper Sacramento Valley, and *dispar* from the east foot of the Sierra along the western edge of the Mohave Desert region. *N. monochrouva* Rhoads and *N. splendens* True seem to be typical *fuscipes*, and *N. macrotis simplex* an intergrade.

The upper molar series is of more nearly equal breadth throughout, the anterior molar not being so broad relatively as in the other groups. The postpalatal notch is usually narrow, though it is broadened anteriorly in *N. fuscipes macrotis* of southern California. The frontals increase in width but slightly from before backward, never expanding abruptly behind the interorbital constriction as in the *leucodon* series. The anterior lobe of  $m^1$  is completely divided by a deep sulcus on the inner side into two loops, except in *fuscipes*, in which the sulcus is relatively shallower and more anterior in position, the division being less complete than in other species. So far as known the group is restricted to the Upper Sonoran and Transition Zones, where it ranges from southern Mexico (States of Jalisco, Michoacan, Mexico, Puebla, and Vera Cruz) northward in the interior to Colorado and northern Arizona, and along the Pacific Coast to Oregon.

(3) *Neotoma desertorum* group.—*Neotoma desertorum* and *intermedia*\* constitute the third group into which it is convenient to divide the restricted genus. The group is not very sharply defined, some forms of *intermedia* coming very close to aberrant forms of the *leucodon* series. The frontals increase in breadth gradually from before backwards, much as in the *pinetorum* group—not suddenly behind the constriction as in the *leucodon* series. There is no supraorbital bead in typical *desertorum*, but *intermedia* shows a decided tendency to the formation of such a bead. The postpalatal notch is narrower than in any other division of the genus. In dental characters the group resembles the *leucodon* series, the molars being decidedly broader anteriorly than posteriorly, and  $m^1$  being made up of three transverse loops, the anterior of which is but faintly indented by the antero-internal sulcus. The members of the group inhabit the Sonoran deserts of northern Mexico and the southern United States, ranging from Chihuahua and Sonora northward to northern Utah, northern Nevada, and middle California.

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\**Neotoma intermedia* Rhoads inhabits the valleys of the coast region of California, south of Monterey Bay. A somewhat paler form, usually more or less suffused with pale ochraceous buffy, inhabits San Geronimo Pass and the western edge of the Colorado Desert. It was provisionally named *gilva* by Rhoads, and has just been renamed *venusta* by True (in a publication received since the present paper went to press), but seems hardly entitled to the distinction of a separate name. *N. californica* Price seems to be a typical *intermedia*. Two subspecies, *albigula* Hartley from south and west Arizona, and *melanura* nob. from Sonora, are here recognized.

(4) *Neotoma arizonæ* group.—*Neotoma arizonæ* and *N. lepida*\* Thomas stand somewhat apart from the other subdivisions of *Neotoma* proper, having bushy tails like those of *Teonoma*, only smaller. In cranial characters they are hardly separable from the *desertorum* group. They inhabit a small area on the southern part of the Colorado Plateau in northern Arizona, northwestern New Mexico, and southeastern Utah, and seem to be restricted to the lower part of the Upper Sonoran Zone.

Respecting the descriptions of new species which comprise the bulk of the present paper, it should be remembered that each relates to a particular pelage. As a rule the summer and winter pelages are different, the winter coat being grayer, the summer coat more ochraceous or fulvous. In some species the summer coat becomes more fulvous or even rusty with age, and the tips of the black hairs wear off, changing the appearance of the animal materially.

*Neotoma leucodon* sp. nov.

*Type* from SAN LUIS POTOSI, MEXICO. No. 50,137 ♂ ad. U. S. Nat. Museum, Department of Agriculture Collection. Collected August 14, 1892, by E. W. Nelson (Original number 3076).

*Measurements* (taken in flesh).—*Type*: Total length 358; tail vertebrae 164; hind foot 38.5. Ear from anterior base 30 (in dry skin).

*Average* measurements of 7 males from type locality: Total length 352; tail vertebrae 160; hind foot 39. Average of 3 females from type locality: Total length 342; tail vertebrae 156; hind foot 37.

*General characters*.—A large species related to *Neotoma micropus* but differing materially in color and in cranial and dental characters.

*Color*.—Upper parts ochraceous-buff tinged with fulvous and plentifully lined with black hairs; sides relatively free from black hairs; nose and face between eyes grayish; underparts white, with plumbeous underfur on sides of belly; fore and hind feet pure white; tail sharply bicolor, blackish above, white beneath.

*Cranial characters*.—Skull with the broad frontal platform of *micropus* and *floridana*, but with sides of frontals decidedly upturned and *postpalatal notch* narrow; ascending branches of premaxillæ very long, nearly reaching plane of narrowest part of interorbital constriction; nasals narrow behind and relatively short, barely cutting plane of orbits; jugals short as in *fuscipes*; length of palate from incisive foramina to postpalatal notch nearly or quite equal to length of incisive foramina: audital bullæ large; infraorbital va-

\*The status of *N. lepida* is not very clear. If the type is not a small female of *N. arizonæ*, it must be very closely related.

cavities large; basisphenoid spine about the same breadth as presphenoid.  
*Dental characters.*—Molars large, very broad anteriorly ( $m^1$  nearly  $\frac{3}{4}$  broader than  $m^2$ ), and white—the whiteness due in part to the absence of color in the osteodentine, which is dark in other species, and in part to the absence of the usual dark fillings in and about the reentrant angles.  $M^1$  with only 2 salient angles and 1 vertical slit on inner side, the anterior loop being undivided; crown of  $m^2$  a trefoil, the anterior lobe pyriform;  $m^1$  with antero-internal sulcus obsolete, and middle loop more transverse than in *micropus*.

*General remarks.*—Specimens of this new species have been examined from La Parada, San Luis Potosi, Berrizoabal, Zacatecas and Perote, Vera Cruz. The Perote specimens are somewhat smaller and have the postpalatal notch narrower and the nasals more acutely pointed behind.

*Neotoma latifrons* sp. nov.

*Type* from QUERENDARO, MICHOACAN, MEXICO. No. 50,135 ♂ ad. U. S. Nat. Museum, Department of Agriculture Collection. Collected August 8, 1892, by E. W. Nelson (Original number 3058).

*Measurements* (taken in flesh).—*Type*: Total length 350; tail vertebræ 149; hind foot 42. Ear from anterior base 26 (in dry skin).

*General characters.*—Similar to *N. leucodon* but smaller, with smaller ears, shorter tail, longer hind feet, and cranial differences.

*Color.*—Upper parts ochraceous buff tinged with fulvous and moderately lined with dark hairs; the fulvous tinge strongest on sides where it runs forward to cheeks; under parts and feet white, the white of belly and chin clouded with plumbeous from under fur; tail indistinctly bicolor, dusky above, becoming soiled whitish beneath.

*Cranial characters.*—Skull similar to that of *N. leucodon* but differing in having the frontal platform even broader, its sides strongly spreading immediately behind interorbital constriction, and forming a projecting angle before leaving orbital fossa; skull as a whole shorter and relatively broader; molars narrower and less crowded;  $m^1$  with antero-internal sulcus more pronounced.

*Neotoma fulviventer* sp. nov.

*Type* from TOLUCA VALLEY, MEXICO. No. 50,165 ♀ ad. U. S. Nat. Museum, Department of Agriculture Collection. Collected Nov. 5, 1892, by E. W. Nelson (Original number 3744).

*Measurements* (taken in flesh).—*Type*: Total length 350; tail vertebræ 160; hind foot 34. Ear from anterior base 26 (in dry skin).

*General characters.*—Similar to *Neotoma tenuicauda* but larger, darker, and under parts dull fulvous instead of white. Ears and feet small; tail slender; texture of pelage fine and soft.

*Color*.—Upper parts dull fulvous becoming almost dusky along the middle of the back; under parts pale fulvous; fore and hind feet white; tail bicolor, blackish above, soiled whitish below.

*Cranial characters*.—Skull similar in general to that of *tenuicauda*, but larger; nasals slightly longer (cutting plane of orbits) and rounded instead of truncate behind; jugal very short; anterior spine of basisphenoid longer; distance across molar series posteriorly greater than length of series on crowns [in *tenuicauda* less]; incisive foramina falling considerably short of plane of  $m^1$  [in *tenuicauda* reaching or nearly reaching this plane]. Contrasted with *N. orizabæ* the skull of *fulviventer* is lighter, the nasals truncate anteriorly [instead of projecting acutely], and the molars narrower.

*Dental characters*.— $M^1$  with 3 well developed salient angles and two vertical slits on inner side as in *tenuicauda* and *pinctorum*;  $m^2$  also as those species.

*Neotoma orizabæ* sp. nov.

*Type* from MT. ORIZABA, PUEBLA, MEXICO. No. 53,653 ♂ ad. U. S. Nat. Museum, Department of Agriculture Collection. Collected April 20, 1893, by E. W. Nelson (Original number 4674).

*Measurements* (taken in flesh).—*Type*: Total length 356; tail vertebrae 163; hind foot 33. Ear from anterior base 28 (in dry skin).

*General characters*.—Similar to *Neotoma fulviventer* but upper parts more buffy ochraceous instead of fulvous; belly white instead of dull fulvous; hind feet shorter; pelage coarser; skull and teeth different.

*Color*.—Upper parts bright ochraceous buff, brightest and purest on the the sides, obscured on the back by black hairs, and becoming grayish on the head; under parts and feet white, the chin and sides of the belly clouded by the plumbeous under fur which shows through; a salmon spot on each side of the breast; tail sharply bicolor, dusky above, whitish below.

*Cranial characters*.—Skull similar to *N. fulviventer* in general form and tooth characters but heavier; frontal narrower interorbitally with edges more upturned; postpalatal notch broader; nasals projecting much further anteriorly and narrowly rounded off in front [instead of truncate anteriorly]. The ascending branches of the premaxillæ extend only a short distance beyond the nasals.

*Dental characters*.—The molars are broader and heavier than in *fulviventer* and have larger dentine islands.  $M^1$  has 3 salient angles and 2 vertical slits on the inner side.

*General remarks*.—Specimens of this general type, differing more or less in minor particulars, have been examined from Chalchicomula, Puebla, Mt. Malinche, Tlaxcala, and Cofre de Perote, Vera Cruz.

*Neotoma mexicana bullata* subsp. nov.

*Type* from SANTA CATALINA MTS., ARIZONA. No. 16,863 ♂ ad. U. S. Nat.

Museum, Department of Agriculture Collection. Collected June 1, 1889, by Vernon Bailey (Original number 114).

*Measurements* (taken in flesh).—*Type*: Total length 335; tail vertebrae 151; hind foot 34. Ear from anterior base 22 (in dry skin).

*General characters*.—Similar to *N. mexicana*; audital bullae peculiar.

*Color*.—Upper parts dull ochraceous buff, becoming grayish on the head and legs, and copiously lined with black-tipped hairs on the back; fore and hind feet pure white; under parts white; under fur plumbeous; a faint ochraceous pectoral collar in type specimen; tail bicolor, grayish brown above, whitish beneath.

*Cranial characters*.—Skull similar to that of *mexicana* in size and general characters; nasal bones broadly truncate posteriorly; audital bulke rather small and curved toward median line anteriorly in a manner not observed elsewhere in the genus, the inner side decidedly concave, and sloping inward.

#### *Neotoma baileyi* sp. nov.

*Type* from VALENTINE, NEBRASKA. No. <sup>4311</sup>/<sub>5034</sub> ♀ ad. Merriam Collection. Collected June 16, 1888, by Vernon Bailey (Original number 41).

*Measurements* (taken in flesh).—*Type*: Total length 371; tail vertebrae 165; hind foot 39. Ear from anterior base 23 (in dry skin).

*General characters*.—Similar in a general way to *Neotoma floridana*, but ears smaller, tail shorter, color grayer; differs also in cranial characters.

*Color*.—Upper parts grizzled gray; face nearly clear gray; fore and hind feet white; tail sharply bicolor, dusky above, white below; under parts white to roots of hairs except on sides of belly where the basal fur is plumbeous and shows through.

*Cranial characters*.—Skull clearly of the *Neotoma floridana-micropus* type, having the frontal platform broad and flat, and the postpalatal notch broadly excavated, but differing from *floridana* in the following characters: Nasal and nasal branches of premaxillae decidedly shorter; basisphenoid spine narrower and sloping from base to apex where it is continuous with slope of presphenoid; presphenoid without the enlarged base of *floridana*; palate much shorter; incisive foramina decidedly shorter [length of palate from incisive foramina equals length of incisive foramina; in *floridana* the palate is much shorter than incisive foramina]. Molar teeth above and below decidedly larger and heavier than in *floridana*; m<sup>1</sup> with antero-internal sulcus nearly obsolete, as in *micropus*.

#### *Neotoma fallax* sp. nov.

*Type* from GOLD HILL, BOULDER CO., COLORADO. No. <sup>5678</sup>/<sub>6345</sub> ♂ ad. Merriam Collection. Collected November 1, 1889, by Denis Gale.

*Measurements of type* (taken from dry skin): Total length 330; tail vertebrae 140; hind foot 31; ear from anterior base 22.

*General characters.*—Similar to *N. intermedia* in external appearance, but differing in important cranial and dental characters, which place it in the *mexicana-pinctorum* series, of which it is an aberrant member.  $M_3$  with 3 instead of 2 salient angles on outer side—a unique character.

*Color.*—Upper parts buffy clay color; everywhere finely lined with black hairs; under parts white, the under color plumbeous and showing through except in a narrow strip along the median line where the hairs are white to roots; fore and hind feet pure white; tail bicolor, dusky above, white below.

*Cranial characters.*—Skull similar to that of *mexicana* but differing from *mexicana* in the following particulars: Nasals narrower posteriorly and reaching posterior plane of lacrymals; ascending branches of premaxillæ exceeding nasals but little; audital bullæ less globular; frontals much broader posteriorly.

*Dental characters.*—Molars as in *mexicana*;  $m^1$  with a strongly developed antero-internal lobe (having 3 instead of 2 salient angles on inner side);  $m_3$  with antero-external loop (having 3 salient angles instead of 2 on outer side, and 2 reentrant angles instead of 1.)

*Neotoma fuscipes streatori* subsp. nov.

*Type* from CARBONDALE, AMADOR CO., CALIFORNIA. No. 64,439 ♂ ad. U. S. Nat. Museum, Department of Agriculture Collection. Collected April 4, 1894, by Clark P. Streater (Original number 3685).

*Measurements* (taken in flesh).—*Type*: Total length 382; tail vertebræ 175; hind foot 38. Ear from anterior base 25 (in dry skin).

*Average measurements* of 3 adult specimens from type locality: Total length 380; tail vertebræ 183; hind foot 37.

*General characters.*—Similar to *N. fuscipes* in size and color, but ears broader; ankles somewhat darker; hind feet from ankles pure white. Cranial characters pronounced.

*Color.*—Upper parts dark grizzly brown, strongly suffused with fulvous, which is brightest and palest on the sides. Under parts creamy white. Tail bicolor, blackish above, whitish below, with distinct line of demarkation; black upper surface covering slightly more than half of circumference of tail. Ankles dusky, in sharp contrast with pure white of feet, and darker than legs; dusky ankle patch covering both sides of but not reaching metatarsus, leaving outer side of heel white.

*Cranial characters.*—Skull similar to that of *N. fuscipes dispar*; palate short, barely equalling length of interpterygoid fossa and of basisphenoid [much longer in *fuscipes*]; incisive foramina reaching back past plane of first molars [not reaching this plane in *fuscipes*]; pterygoid fossa narrow and rounded anteriorly as in *dispar*.

*Neotoma fuscipes dispar* subsp. nov.

*Type* from LONE PINE, OWENS VALLEY, CALIFORNIA. No. <sup>25391</sup>/<sub>32804</sub> ♂ ad. U.

S. Nat. Museum, Department of Agriculture Collection. Collected December 25, 1890 (Original number 2310).

*Measurements* (taken in flesh).—*Type*: Total length 410; tail vertebræ 208; hind foot 39. Ear from anterior base 31 (in dry skin).

*General characters*.—Similar to *Neotoma fuscipes* in size and proportions except that the tail is not so long; coloration pale, much as in the Mohave Desert *N. mexicana desertorum*; tail strongly bicolor.

*Color*.—Entire upper parts ochraceous buff, palest on the head; back moderately lined with black-tipped hairs; feet and under parts white; the white of the belly enroached upon by the buffy-ochraceous of the sides; tail bicolor; above brownish-gray; below soiled white, with distinct line of demarkation. The grayish-brown of the ankles is pale and does not extend out over the metatarsals.

*Cranial characters*.—The skull is clearly of the *fuscipes* type, having the long rostrum, long nasal bones, and last upper molar of that species. It differs from typical *fuscipes* (from north of Monterey Bay) in the following particulars: Zygomatic arches narrow and much less spreading anteriorly; nasal branches of premaxillaries shorter; palate shorter; interpterygoid fossa longer; postpalatal notch somewhat broader and evenly rounded anteriorly; angular processes of mandible much sharper (not rounded off as in *fuscipes*). The best characters are the shortness of the palate, the depth of the pterygoid fossa, and the broadly rounded form of the postpalatal notch. In typical *fuscipes* this notch is narrow, abruptly truncated anteriorly, and usually enroached upon by a blunt projection from the posterior edge of the palate. In subspecies *macrodis* the pterygoid fossa is much broader and shorter.

#### *Neotoma desertorum* sp. nov.

*Type* from FURNACE CREEK, DEATH VALLEY, CALIFORNIA. No <sup>25739</sup>/<sub>33139</sub> ♂ ad. U. S. Nat. Museum, Department of Agriculture Collection. Collected January 31, 1891, by T. S. Palmer (Original number 43).

*Measurements* (taken in flesh).—*Type*: Total length 305; tail vertebræ 128; hind foot 30. Ear from anterior base 27 (in dry skin).

*Average measurements* of eight males from type locality: Total length 299; tail vertebræ 132.5; hind foot 30. Average of thirteen females from type locality: Total length 284; tail vertebræ 128; hind foot 29.

*General characters*.—Similar to *N. intermedia* in general appearance but decidedly smaller, with larger ears, softer and more silky pelage, coloration more ochraceous buffy instead of gray. Skull characters distinctive.

*Color*.—Upper parts pinkish buff, most intense on the sides, becoming grayish on the head, finely lined on the back with blackish hairs; fore and hind feet pure white; tail bicolor, pale dusky above, white beneath; under parts superficially white, more or less washed with salmon on the neck,

breast and belly (often forming a roseate pectoral collar); hairs plumbeous at base except a pectoral patch and an irregular strip down the middle of the belly, which are white throughout. Some specimens from old Fort Yuma have the upper parts very pale buffy.

*Cranial characters.*—Skull much smaller, thinner, and less angular than that of *intermedia* or *albigula*; interparietal much smaller and less elongated transversely; interorbital constriction much narrower, with edges more up-turned; audital bullæ much larger; opening of posterior nares narrower; nasals truncate but less broadly than in *intermedia*.

*Neotoma desertorum sola* subsp. nov.

*Type* from SAN EMIGDIO, KERN CO., CALIFORNIA. No. <sup>31516</sup>/<sub>43381</sub> ♂ ad. U. S. Nat. Museum, Department of Agriculture Collection. Collected October 24, 1891, by E. W. Nelson (Original number 1369).

*Measurements* (taken in flesh).—*Type* (male): Total length 330; tail vertebrae 148; hind foot 36. Ear from anterior base 29 (in dry skin). Female from type locality: Total length 324; tail vertebrae 151; hind foot 33.5.

*General characters.*—Similar to *N. desertorum*, but larger.

*Color.*—Upper parts ochraceous buff, lined with black-tipped hairs; fore and hind feet and underparts white; basal fur plumbeous on sides of belly and chin; tail bicolor, grayish brown above, white below.

*Cranial characters.*—Skull similar to that of *desertorum* but larger; interorbital breadth greater; interparietal much larger; audital bullæ less inflated; nasals longer, and broader posteriorly; ascending branches of premaxillæ shorter and slighter.

*Neotoma intermedia melanura* subsp. nov.

*Type* from ORTIZ, SONORA, MEXICO. No. <sup>17819</sup>/<sub>24756</sub> ♂ yg. ad. U. S. Nat. Museum, Department of Agriculture Collection. Collected November 13, 1889, by Vernon Bailey (Original number 671).

*Measurements* (taken in flesh).—*Type*: Total length 333; tail vertebrae 170; hind foot 34. Ear from anterior base 25 (in dry skin).

*General characters.*—Size rather small; ears large; coloration peculiar; back olivaceous; tail black above (probably a peculiarity of winter pelage); cranial characters of the *albigula* type.

*Color.*—(Winter pelage) Upper parts olivaceous from a fine intermixture of black-tipped hairs on an ochraceous-buffy ground; sides nearly clear ochraceous-buff; fore and hind feet pure white; ankles blackish in sharp contrast to color of hind feet; tail sharply bicolor, dorsal side black, ventral side white; under parts white; chin, throat, breast and line down middle of belly white to roots of hairs; sides of belly with plumbeous under fur.

*Cranial characters.*—Skull similar to that of *N. intermedia* but smaller; nasals narrower posteriorly: anterior loop of m<sup>1</sup> partly divided by antero-internal sulcus.

*General remarks.*—This animal in winter pelage looks like im-

mature specimens of *N. pinetorum*, but the marked cranial characters serve to distinguish it at once. No specimens in summer pelage are at hand from the type locality, but specimens from Hermosillo and Magdalena, apparently the same sub-species, are grayer, the black hairs of the back are inconspicuous, and the upper side of the tail is less black.

*Neotoma intermedia angusticeps* subsp. nov.

Type from S. W. CORNER OF GRANT CO., NEW MEXICO (only 5 miles from Mexican boundary). No. <sup>2325</sup>/<sub>2833</sub> ♂ ad. Merriam Collection. Collected April 12, 1886, by A. W. Anthony (Original number 62).

*Measurements of type specimen.* Total length 335 (measured in flesh). Tail vertebrae 150; hind foot 33; ear from anterior base 25 (in dry skin).

*General characters.*—Similar to *N. albigula*, but ears smaller; color more strongly fulvous; skull more elongated and narrower.

*Color.*—(Summer pelage) Upper parts fulvous, becoming ochraceous buff on the head, and abundantly lined with black hairs; feet and under parts creamy white to roots of hair, except on sides of belly where the basal hair is plumbeous; tail bicolor, grayish brown above, white beneath.

*Cranial characters.*—Skull similar to that of *albigula* but longer and more slender: Basal length 42; basilar length of Hensel 39.5; greatest zygomatic breadth 24; interorbital constriction 6. Cranium rather smoothly rounded—not so angular as in *intermedia* and *albigula*; zygomatic arches narrow and less angular posteriorly than usual in the group; frontals broad interorbitally but not widening rapidly behind constriction, the orbital margins neither beaded nor upturned; nasals cuneate; ascending branches of premaxillae normally thickened behind nasals but not divaricating; interparietal shield subquadrate; anterior loop of  $m^1$  only slightly indented by sulcus.

Subgenus TEONOMA Gray, 1843.

Type, *Neotoma cinerea drummondi* (Richardson) from the Rocky Mts. 57° N.

Tail very large, bushy, and somewhat distichous, like a squirrel's; hind feet very large.

Rostrum much elongated, measuring more than one-third the total length of cranium; posterior roots of zygomata widely spreading; sagittal area long, narrow, and sharply angular, its broadest part far back, on or nearly on plane of anterior border of interparietal, whence the sides bend abruptly back to interparietal shields; sphenopalatine vacuities closed or open.\*

\*In a previous communication (Proc. Biol. Soc. Wash. viii, July, 1893, 112), I called attention to the circumstance that the long vacuities always present on each side of the presphenoid and anterior part of the basisphenoid in *Neotoma* proper, are closed by ascending wings from the palatine bones in *N. cinerea* and *occidentalis*. I then regarded this character as of sub-generic weight. It now appears to be of specific weight only, for the vacuities are open in the new species from Colorado here described as *N. orolestes*.

The members of this series are a very compact group, comprising *N. cinerea* with its subspecies *drummondi* and *occidentalis*, and *N. orolestes* nob.

*Neotoma orolestes* sp. nov.

*Type* from SAGAUCHE VALLEY (20 miles west of Sagauche) COLORADO. No. 35906  
48215 ♂ ad. U. S. Nat. Museum, Department of Agriculture Collection. Collected August 13, 1892, by J. Alden Loring. (Original number 482).

*Measurements* (taken in flesh).—*Type*: Total length 413; tail vertebræ 175; hind foot 41. Ear from anterior base 31 (dry skin).

*General characters*.—Similar to *N. cinerea*; size large; tail large and bushy; sphenopalatine vacuities open.

*Color*.—Upper parts in summer pelage buffy-ochraceous, more or less suffused with fulvous and everywhere lined with black hairs; top of head grayish, becoming clear gray on nose; cheeks buffy-ochraceous; under parts and feet white; color of hind legs reaching out a short distance over tarsus; sides of belly with plumbeous underfur; tail bicolor; dorsal side concolor with back on proximal  $\frac{1}{3}$ , becoming dusky on distal  $\frac{2}{3}$ ; ventral side whitish, obscured by pale fulvous proximally.

*Cranial characters*.—Skull similar to that of *N. cinerea* but differing in having the sphenopalatine vacuities open, the ascending wings of the palatines leaving a long open slit on each side of the presphenoid and anterior third of the basisphenoid. The mandible differs in having the angle larger, longer, and more everted, the extreme tip falling outside of the vertical plane of the condyle.